SCIENCE.

FRIDAY, OCTOBER 31, 1884.

COMMENT AND CRITICISM.

THERE is probably nothing which we can recognize as so entirely characteristic of our own epoch of history as co-operation, — the union of a number of men for a common purpose. Co-operation is very old; but its present frequency, and often also its form, are new, and therefore it has a significance for us, the extent of which is great, but still unmeasured. It is, indeed, the very essence of democracy. But we have not to do with the general aspects of this great subject: we wish only to refer to its increasing development in scientific research; and even of that development we intend to direct attention only to the prevalent tendency towards systematic and organized co-operation.

In our recent numbers we have had occasion to report the progress of several noteworthy scientific undertakings which are strictly co-operative. We need only remind our readers of the new standard time, the electrical and meridian conferences, and the reports of the investigating committees of the British association, as illustrations of the accomplished good which science owes to co-operation. Our experience of the benefits to be had through the efforts of competent men, united in conferences, committees, and congresses, to settle some scientific problem, is rapidly changing what was formerly a sporadic effort into a confirmed habit of the civilized world. The same proclivity has another manifestation in the still more novel custom of what we venture to designate as co-operative observation. A central bureau, a society or committee, receives and collates the data obtained by scattered observers. The earliest instances we recall of this method of centralized collation is of meteorological observations, in this country conducted for many years by the Smithsonian institution. Such, too, is the method adopted by the English society for psychical research, by the American ornithological union for tracing the migrations of birds, by Mr. Galton in his remarkable studies, by the English committee for the collective investigation of disease; and so on through a long list. Again, through the energy of the Harvard observatory, there is an extensive system of co-operation among astronomers, and the British association is endeavoring to systematize the work of the numerous local societies in Great Britain.

One naturally stops to ask, What is to be the future? Will the co-operative tendency, which is already so strong, go on increasing? We think the answer must be in the affirmative; because the more systematized scientific research becomes, just so much surer and steadier will discoveries ensue. At present individual tastes have far too large a share in deciding what is investigated, and hence follows the deplorable consequence that many an important subject is neglected because no one happens to be interested in it. Moreover, there is much work to be done which can be accomplished only by scattered observers who obey a pre-arranged system. May we not, therefore, reasonably expect a great deal for science in the future from systematized co-operation?

THE medical journals are just now giving an interesting illustration of the ease with which the members of a busy profession may overlook their own past, and occupy themselves with experiments and investigations, only to find that the same results and disappointments had been reached and fully recorded long before. Not many months ago a French physician, at the suggestion of another from Copenhagen, tried etherization by the rectum, and in a report of

cases called attention to it as a 'new method' for the administration of this anaesthetic. His work made an impression in his own country and on this side of the ocean. Others took up the method; and the journals had much to say about the promise which this improvement held out of being very useful, not merely in some special operations, but also in general. Then came reports of unpleasant complications and unexpected effects more or less beyond the control of the operator.

While this experience was growing, and practical rules were slowly getting formulated, some of the older doctors, and some of the more 'literary fellers' of the craft, bethought themselves, and remembered that this 'new method' was, after all, nearly as old as ether anaesthesia itself. It seems that in 1847 Pirogoff recommended this application of ether-vapor, others having tried a similar use of the liquid alone or in a mixture with water. Pirogoff and the few others who gave the really new method a trial were not altogether satisfied, and seem to have abandoned it in a short time, except to meet a few very special conditions. Twenty-one years ago (1863) all this was fully described, and the dangers of such administration pointed out, by Perrin and Lallemand in their work on surgical anaesthesia; and as late as 1875 Claude Bernard mentioned it as an 'historically curious' method of considerable uncertainty and little practical value.

There would seem to be no easy way of avoiding such repetitions, unless, perhaps, to have some member on the editorial staff of every medical journal learn a few of the larger indexes by heart, and stand ready to nip all 'new' methods and schemes in the bud. In general, however, a certain amount of repetition, even in practical matters, is not always objectionable; and, in scientific research in competent hands, it is even less so. The corroboration which may thus be obtained has frequently considerable value. Then, too, it must not be forgotten, that a fresh investigator who takes up an old problem apparently solved, perhaps is likely to approach it from another point of view, and with different traditions and equipment from his predecessors. Thus it is possible, that what at first appears to be needless repetition may lead to important results. It is a common experience, too, that few sets of old observations are really complete or useful, save for the particular and limited objects which interested the investigator.

The use of the word 'scientific' at the present time, illustrates how custom overrides etymology, giving sanction to an application of a word quite inconsistent with its derivation. 'Scientific' means, strictly, 'knowledge-making;' but it is employed to signify 'relating to, or in accordance with, science.' Last week we reviewed a work on 'scientific butter-making.' Now, if we could, by any process of manufacturing butter, produce science at the same time, every one would agree that it was an eminently practical and economical invention; but, alas! the true Anglo-Saxon defies etymology; and nobody will misunderstand the customary meaning of 'scientific' in adjectival association with butter-making, or when used to qualify much else which never makes knowledge. The word is a curious example of error becoming correct through usage. If we could only add the word 'sciential' to the language, usage might then conform to etymology in regard to 'scientific' by transferring half its duties to the new adjective.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Iroquois grammar.

The lively letter of your esteemed correspondent, Mrs. E. A. Smith, is satisfactory in one respect; as it explains clearly her views on the subject discussed by her at the late Montreal meeting, and now more briefly in your columns. Her remarks lead to inferences for which she is probably unprepared, and which she will be inclined to regret and disown; for she doubtless, like all who know the French missionaries among the Iroquois, has a high opinion of their learning and worth. Yet her suggestions necessarily imply that these worthy men are sadly incompetent

for their duties as teachers and translators, or worse than incompetent. We are, in effect, given to understand that they have either mistaken or purposely misrepresented the meaning of certain important pronouns, which they must have heard and used constantly for many years, and on which, to a great extent, the life and force of the language depend. If this is the fact, their scriptural and other translations, and their tracts and other original works, in the Iroquois language, which conform strictly to this system of grammar, must be all wrong. Furthermore, it must be considered that the English missionaries among the western Iroquois (the Mohawks) have, during the last hundred years, published several scripture and other translations in that language. These, though made altogether independently of the French versions, and with a very different orthography, are based on the same system of grammar; and if Mrs. Smith is right, these versions are, of course, erroneous. Still further, several scripture translations have been made by educated Indians among both the eastern and the western Iroquois. These follow the same grammatical method. That Indians, writing for Indians, would use their language incorrectly, is a supposition which Mrs. Smith herself will perceive to be inadmissible. This simple fact is therefore decisive of the question, and shows clearly that the missionaries are in the right.

If your respected correspondent has any doubt about the correctness of the statement now made, she can readily satisfy herself by reading and analyzing the translations referred to. She has assuredly no desire to do injustice to any person; and she will therefore be pleased to have her attention drawn to this easy and satisfactory test. In justice to Mrs. Smith herself, it should be remembered that the Iroquois is one of the most difficult of languages, requiring years of study to master it. That a beginner in this study, however intelligent and zealous, should be occasionally at fault about a point of grammar, is both natural and pardonable; but that learned missionaries, who have had forty years of practice in the language, who speak and write it as fluently as they do their own, and some of whom are accomplished philologists, should be mistaken on such points, is simply incredible.

To say that it is 'hazardous' for one who is not perfectly familiar with a foreign speech to undertake to expound its niceties to those who are adepts in it, is merely to hint a friendly warning. Nothing, indeed, can be more ill-advised than such an attempt. When a distinguished French writer rashly suggested that the name of the 'Frith of Forth' was probably a corruption of the 'first of the fourth,' his readers were inclined to measure from this absurd suggestion the extent of his knowledge of the English language, and perhaps did him much injustice. THE REPORTER.

Points on lightning-rods.

Mr. A. B. Porter's letter in relation to points on lightning-rods (*Science*, iv. p. 223) suggests the propriety of calling attention to the fact, that, inasmuch as the 'power of points' in neutralizing the electrical charge of the cloud depends upon the convective discharge of the opposite kind of electricity from the point of the rod, it is evident that it requires time for the rod to effectually perform its true function of disarming the cloud, and thereby averting the disruptive stroke. If a highly charged cloud is rapidly driven towards the point of the rod, the latter may not have time to neutralize the electricity of the cloud, and the rod may receive the disruptive stroke of lightning: this seems to have been the case with Mr. Porter's rod. If the cloud had slowly approached the pointed conductor, it would have been silently neutralized, and the stroke averted. The significant point is, that convective neutralization is a gradual process, requiring *time* (see *Nature*, xxiii. p. 386). A familiar class-experiment will illustrate this point. If a charged Leyden-jar is held in one hand, while a sharp-pointed needle is held in the other hand, and the point of the needle is slowly brought towards the knob of the jar, no shock will be experienced when the point of the needle touches the knob: the charged jar is silently neutralized during the gradual approach of the point. On the contrary, if the point of the needle is rapidly brought towards the knob, a visible spark will pass to it, and a more or less severe shock will be experienced by the experimenter. JOHN LECONTE.

Berkeley, Cal., Oct. 7.

A wider use for scientific libraries.

Your remarks in *Science* (iv. 335–336) on a wider use for the libraries of scientific societies, give me occasion to mention at least two societies which make such use of their libraries. I think you would do a service by collating a list of such societies, and making a statement of their rules for the loan of books. A brief standing notice, or one occasionally inserted, would be of service to your readers. Certainly the societies not deriving a revenue from these loans should not be expected to advertise at their own expense.

The constitution of the American association for the advancement of science provides that all books and pamphlets received by the association shall be catalogued, and that members may be allowed to call for such books and pamphlets to be delivered to them at their own expense; but as yet the books are not available, as the catalogue has not been made. The Cambridge entomological club allows subscribers to *Psyche* the use of its library under certain restrictions, — a library containing about a thousand titles. On the other hand, the American entomological society provides that "no books presented to the society shall be loaned from the hall under any pretence or for any purpose whatsoever."

The publishers of the *Revue et magasin de zoologie*, at Paris, conducted for many years a circulating library amongst the subscribers to the magazine, and reported that they had never sustained the loss of a single volume. Will not other societies or periodicals copy these practices? B. PICKMAN MANN.

Washington, D.C., Oct. 21.

A possible danger to mariners.

During the whole of the night of Aug. 23, 1884, the lantern of the lighthouse at Cape San Antonio, the westernmost point of the Island of Cuba, was surrounded by a cloud of winged insects, almost entirely of a bright red hue, their presence causing the light to assume a decided red color. The wind was moderate and from the south-west; the sky was overcast. A few of these insects have been sent to this city by Francisco Bautista, the keeper of the light, and identified as Dysdercus sanguinarius Stål, the cotton-stainer. Though other insects have been observed to fly towards lights, this is the first time that this species has been so reported. It is to be hoped that such dangerous action will not prove chronic with this brilliant and beautiful hemipteron. L. S. F.

New York, Oct. 23.

THE WORK OF THE MERIDIAN CONFERENCE.

Though entangled and loaded down with the cumbersome and roundabout methods of diplomacy, and unnecessarily surrounded with the secrecy of our State department, the Meridian conference has yet reached, in the main, very sensible conclusions; much the same, no doubt, as a body composed entirely of the leading representatives of the scientific and business interests involved would have reached in one-fourth the time, with much greater unanimity, and without stirring up the feelings and jealousies which the semi-political character of the body has engendered, and which will make its conclusions of much less weight, since a considerable percentage of the delegates will decline to recommend them to their respective governments. But with England, the United States, and the principal European powers, France excepted, in accord, the action of the rest will be of less importance, however desirable unanimity would have been.

It was almost a foregone conclusion, that Greenwich would be selected as the prime meridian, on account of the overwhelming scientific and commercial reasons in its favor; while the proposition for an entirely new neutral meridian, with its necessary confusion and needless expense, merely for sentimental reasons, was too absurd to deserve serious consideration.

The conclusion to reckon longitudes east and west to plus and minus 180° is, no doubt, all things considered, the best. Considered simply as a method of putting down longitudes on charts, the continuous reckoning from 0° to 360° is, without question, less liable to mistake, simpler, and mathematically more elegant. But longitude is inseparably connected with local time, and herein arises the following difficulty. So long as the sun shines, and the earth revolves on its axis, the mean solar day, with its alternating light and darkness, must be the great natural unit of time-reckoning. Moreover, for civil purposes the date must change during the hours of sleep; and hence the civil 'day' must begin in the night, and should, for convenience, begin within an hour at least of midnight. Therefore civil dates and hours must be approximately local ones; i.e., must differ with the continuous westward sweep of the sun, the eastern times being farther ahead. A necessary consequence is, that on some meridian of the globe, where the east meets the west, the local time must jump one day; so that the people living on the west side of this line, i.e., in the 'far east,' will be one day ahead of their neighbors on the east side; and there is no way of avoiding this inconvenient arrangement. There is thus an inseparable connection between universal or absolute time, local time, and longitude; and the connection will be most simply expressed, and most easily comprehended, if the longitudes jump 360° at the same point on the earth where the local time jumps twenty-four hours.

The recommendations of the conference, that the prime meridian be that of Greenwich, that the universal day be the civil day (beginning at midnight) of the prime meridian, and that longitudes be reckoned to plus and minus 180° east and west respectively from this meridian, accomplish their object with the least change from the existing status, the day and the longitudes changing in the Pacific at 180° from Greenwich.

For the few islands lying close to, or on both sides of, the 180th meridian, like the Feejees, which are bound to keep up intercourse with each other, it will be most convenient to have the same day; and this will fall in with the adopted plans, if the longitudes are all given with the same sign, and extended a little beyond 180°, to include the group.

The recommendation to count the universal day from zero to twenty-four hours might well have been extended to the local times as well, though not so essential in this case. Still, the more international intercourse and cable news bring out the differences between local times and their relation to absolute time, the more inadequate and unsatisfactory seems the clumsy A.M. and P.M. division of the day into two parts. Railroads can do something towards doing

away with this by publishing their time-tables to twenty-four hours. But the great obstacle lies in the dials of our watches and clocks; for until the hour-hands are made to revolve once in twenty-four hours, either on a separate dial, like most astronomical clocks, or with a separate twenty-four-hour division, and numbers on the main dial, people will naturally cling to the twelve-hour period. There is also the additional obstacle, that, if clocks are to strike to twenty-four, these large-numbered hours would seem interminably long; but the change in the striking arrangements would not be of so much importance.

It seems unfortunate that Mr. Allen's resolution for local times, differing by whole hours from the universal time, was not recommended; for this would seem to be by all odds the simplest way of connecting local and universal times. It is already in almost universal use in this country.

The sixth resolution of the conference, recommending that the nautical and astronomical days correspond with the civil, is open to discussion. The two naturally go together. And to the navigator it is of little moment: he would simply change his chronometer-reckoning twelve hours, buy a new ephemeris, which the astronomer would have computed for him, make the proper entry in the log, and go on as before. With the astronomer it is a more important matter. The ephemerides are issued, and the computations projected, so far ahead, that five years at least would elapse before the change could be made, even if agreed upon to-day. But with the astronomer there is the same reason for changing date at noon as for changing the civil date at midnight. While the rest of the world is sleeping, he is at work.

The seventh resolution of the conference, which would seem to be a rather poor translation of a French original, contains a suggestion as important as any thing it did. We believe that all systems of weighing, measuring, dividing, and reckoning any thing whatever, should be the same as the system of numeration in use; and, as long as this is so universally decimal, such should be the system for all these. No doubt, an octaval system of numeration, with its possible subdivision, 8, 4, 2, 1, would have been originally better; but there is no sufficient reason for a change now.

NORTH-ATLANTIC CURRENTS.

FROM time to time the great iron sea-buoys set to mark shoals, or to indicate entrances to channels, are forced from their moorings, and go adrift.

These buoys are of several types. The nun-buoys are pear-shaped; and the largest of them are twelve feet long, and eight feet across in the widest, and about two in the narrowest, part. The can-buoy is like the nun-buoy, except that it is wider at the top: both are

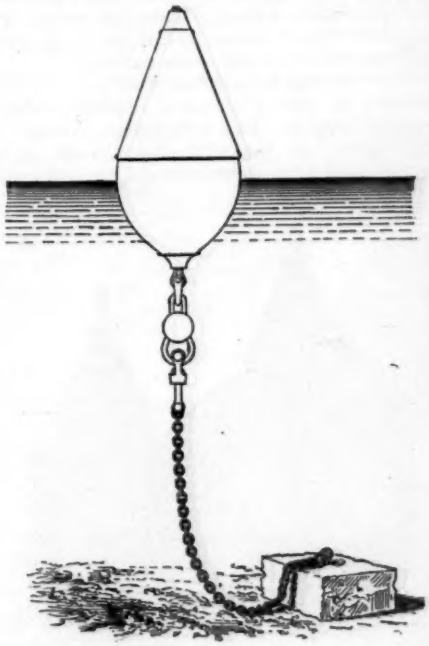

FIG. 1. — IRON NUN-BUOY.

widest at the line of flotation. In the oval bottom a steel loop is cast, to which is appended two fathoms of an inch-and-a-half stud chain, to which is fastened a solid iron ballast-ball of a thousand pounds weight, with two loops cast in it at opposite sides. To the ball is hung from fifteen to twenty fathoms of the

same-sized chain, to which is attached, in some cases, a three-thousand-pound mushroom anchor, which is shaped like an open inverted umbrella, and in many cases a stone-sinker, as shown in the cut. The buoy is separated by diaphragms into several water-tight compartments, so that one of them may be punctured without sinking the buoy. They are made of boiler-iron, and are tested by hydrostatic pressure before being placed in the water, and they will stand much hard usage.

When these buoys are lifted from their assigned positions by ice, they carry their moorings with them, and, when left by the ice, have sufficient buoyancy to float these accessories, though under such circumstances they are sunk somewhat below their ordinary line of flotation. They show a surface, at most, of eight by six feet above water, while the mushroom anchor it is dragging must be fully one hundred feet below water. Hence the winds can have little effect on the motion of the buoys, in comparison with the ocean-currents.

The whistling-buoy differs from the ordinary sea-buoy in having a hollow tube from eighteen to forty-five feet long thrust through it and down into the still water, while it is surmounted by a steamboat-whistle. As the

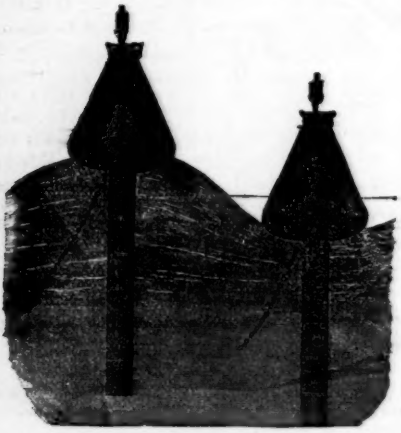

Fig. 2. — Courtenay's whistling-buoy.

buoy rises, the air is received into the tube through a set of ingeniously arranged valves. As it sinks, the air is forced out through the whistle.

The lighted or gas buoy is filled with compressed illuminating-gas, and is surmounted by a protected burner. It will burn from three to six months, according to its size, without being refilled.

As the government pays those who pick up any stray buoy a reasonable price for their trouble, they are often brought into port.

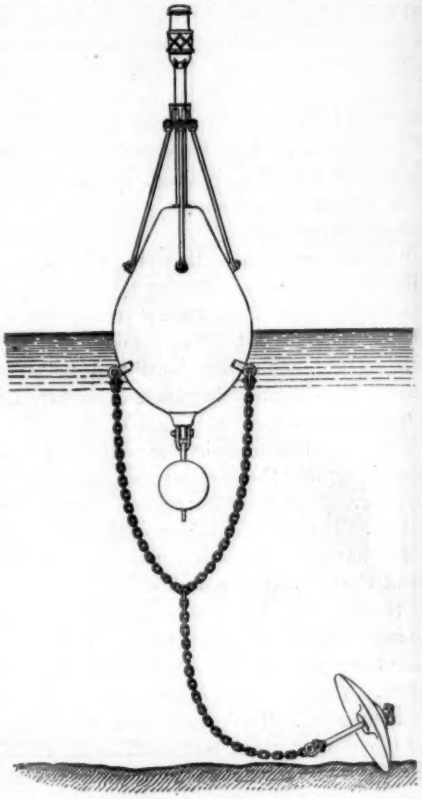

Fig. 3. — Pintsch gas-buoy.

The position of each of the stray buoys so far reported, and the prevailing currents so far as known, are shown on the accompanying chart. The buoys are plotted and numbered to correspond to the paragraph below, which gives such history of the buoy as could be obtained from official sources. The buoys are not numbered consecutively, but in the order in which the writer heard of each being sighted.

1. Whistling-buoy, recently adrift, as the paint was still fresh when it was sighted, May 17, 1881.

2. Sighted June 15, 1884. Same as No. 19.

3. Can-buoy of the largest size, picked up March 17, 1881, near Bermuda; supposed to have come from New-York Bay.

4. Large iron sea-buoy, which had hanging to it about thirty feet of heavy chain. It came from Sandy-Hook bar, in New-York Bay.

5. One of the largest of the iron nun-buoys. There was hanging to it some twelve feet of stud-link two-and-a-quarter-inch chain, from which dangled a thousand-pound ballast-ball. It was picked up about the middle of July last, some twenty-five miles south-west from Montauk Point, in good condition except that its lower compartment was filled with water. It was evident that it had come from some part of our southern coast.

6. Large red buoy, with tower and lantern on top. It was discovered June 11, 1884, and would have been picked up but for the bad weather. Same as No. 7.

7. Picked up June 21, 1884, about four hundred and eighty miles due east of New York. Same as No. 6. This buoy went adrift from its station on Hatteras Shoal, off Cape Hatteras, between May 24 and June 4, 1884. It had made over twenty miles a day in a north-east course. It is of this buoy that *Science* said (No. 77, p. 92) that it was unfortunately picked up. If it had only been sighted and reported by each passing vessel, we might have had a record of its curious voyage, and known something more of the currents by which it was impelled.

8. Iron buoy of the largest size. It was picked up on the west coast of Ireland in the spring of 1871.

9. Iron nun-buoy of the largest size, with a heavy chain and ballast-ball attached. Went ashore in Pendeen Cove, Penzance Bay, on the south-west extremity of the English coast, about March 1, 1884. It probably left New-York Bay during the preceding winter.

10. Iron sea-buoy, picked up by the Norwegian bark Vance in March, 1871.

10½. Large nun-buoy painted red, passed July 20, 1884.

11. Iron sea-buoy, picked up on Aug. 30, 1883, on the eastern side of Teneriffe, with a thousand-pound ballast-ball and a forty-two-foot chain attached.

12. Second-class iron sea-buoy, was picked up on Oct. 20, 1883, about fifteen miles from the east side of Teneriffe, and had attached to it a fifteen-inch seven-hundred-and-fifty-pound ballast-ball, and about thirty feet of chain-cable.

13. Iron sea-buoy, picked up June 5, 1882.

14. Picked up Aug. 22, 1883. It was one of the largest iron buoys, and had attached to it a thousand-pound ballast-ball, forty-eight feet of heavy chain-cable, and a three-thousand-pound mushroom anchor. It was recognized as one of those carried to sea from New York Bay by the ice in December, 1880.

15. Iron sea-buoy, which went ashore in February, 1881, on one of the quays near Turk's Island; sent home.

16. Whistling-buoy, passed June 24, 1884.

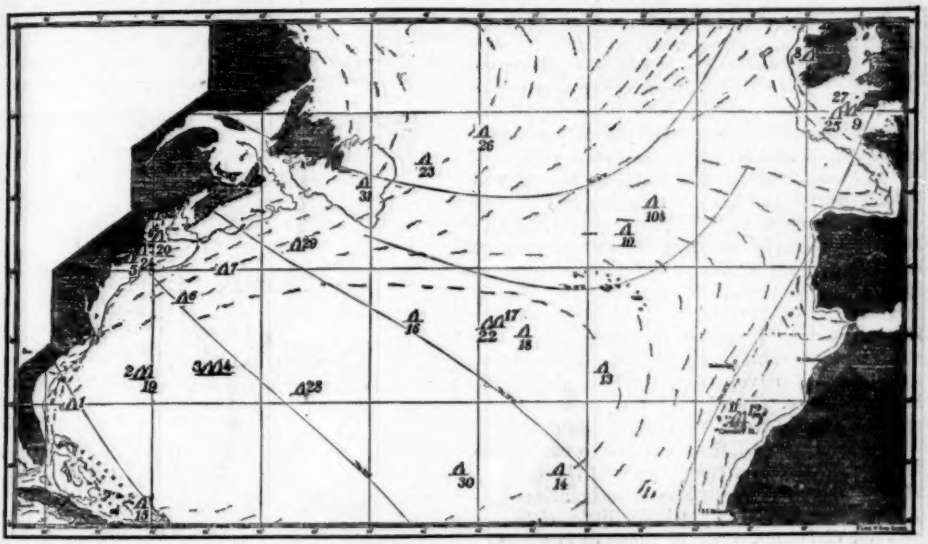

FIG. 4.—CHART OF STRAY BUOYS IN THE NORTH ATLANTIC.

17. This is doubtless the same buoy as that numbered 18 and 22 on the chart. It was sighted June 29, 1884, and described as 'a large buoy, painted red, with patent fog-horn.'

18. A whistling-buoy. It stood about twelve feet out of water. It was passed June 29, 1884. The same buoy is plotted as No. 17, and also as No. 22, reported by two other ships.

19. Whistling-buoy, passed July 14, 1884. The same buoy is plotted as No. 2 on the map, and was seen a month before by another ship.

20. Second-class red whistling-buoy, picked up April 30, 1884, twenty-five miles off Cape Cod, which had broken adrift from Lurcher Shoal, Nova Scotia. This is the only case where a buoy is known to have drifted at once to the southward.

21. After the other buoys were plotted, it was found that No. 21 and No. 6 were the same buoy, it having been twice reported by the same ship: so it has only been plotted as No. 6.

22. Passed June 22, 1884; also plotted on the chart as Nos. 17 and 18 in the positions in which it was reported by two other vessels.

23. Iron can-buoy, run into by a British bark June 17, 1884, about twelve miles from the Flemish Cap, on the banks of Newfoundland.

24. Large iron buoy, passed June 22, 1884, 'sixteen miles south-west from Gay Head,' Martha's Vineyard.

25. Large iron conical-shaped buoy, passed June 24, 1884, forty miles west of Bishop, Scilly Isles, off the west coast of England.

26. Black barrel-buoy, passed June 29, 1884.

27. Large red iron buoy, floating upright, passed July 7, 1884, seven miles from Bishop Rock, Scilly Isles.

28. Very large red iron buoy, passed Aug. 4, 1884.

29. Large conical-shaped iron buoy, passed Aug. 1, 1884.

30. Large iron can-buoy, which from appearances had been floating a very long time; passed Aug. 4, 1884.

31. Second-class can-buoy, picked up on the banks of Newfoundland, August, 1884.

32. Second-class can-buoy, picked up about twenty-five miles from Cape Elizabeth, Me., in August, 1884.

It would almost seem as if the buoys shown on this chart had attempted a system of circle-sailing, and as if several of them had nearly gotten round to their moorings after having circumnavigated the North-Atlantic Ocean. How else shall we account for the position of those picked up off the Canaries, those sighted in the Sargasso Sea, those found off Turk's Island and the Bermudas? When some of these data were presented to the Philosophical society at Washington, and the matter was discussed by naval, coast-survey, and light house officers, the weight of the expressed opinion seemed to be in favor of this theory.

But the object of this paper is to call attention to the fact that the voyages of these buoys show the trend of surface or submarine currents, of which we as yet know little, either as to their direction, force, or times of flow. The current indications on this chart show the approximate sum of our present knowledge on the subject. It is evident that it would be greatly to our advantage to know more. *Science* said a short time ago that it was unfortunate that the gas-buoy (No. 6) was picked up. Would it not be in the interests of science, of commerce, and of navigation, if some such object as that buoy, drawing as much water, floating as lightly, showing as little surface to the wind, and offering as little resistance to colliding vessels, were allowed to float, and were carefully watched until it should have gone ashore? And why could not some slow-sailing vessel be detailed for such duty? At any rate, if such an object were set afloat and reported by every vessel which sighted it, its voyage might add much to what we know of the ocean-currents; and if such objects were set adrift simultaneously, from, say, Nantucket, Penzance, Teneriffe, the Cape de Verde and Turk's Island, or the Bermudas, we might learn much more on this interesting subject.

A. B. Johnson.

DRUMLINS.

The arched hills of glacial drift that have been called drumlins by the Irish geologists are among the most peculiar results of the action of land ice-sheets. They are composed of closely-packed bowlder-clay, or till, distinctly unstratified, and containing well-scratched stones. They rest on a foundation of glaciated rock, and rise in a smoothly rounded mass from fifty to two or three hundred feet in height, reaching from a quarter of a mile to two miles in length. Their bases vary in form from a circle to a long, nar

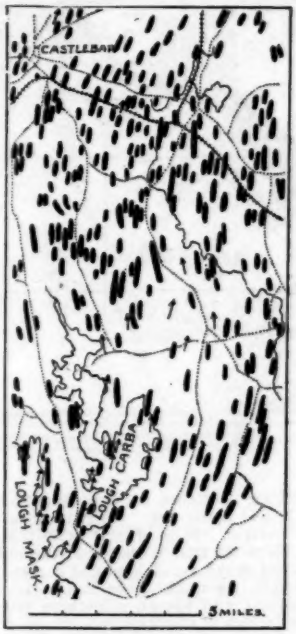

Fig. 1.

row oval; and, when elongated, their major axes are closely parallel to the direction of former local glacial motion. They are therefore easily distinguished in form and structure from the rolling hills of terminal moraines, and from the ridges and mounds of osar and kames. Although they form pronounced features in a landscape, their distribution is as yet

imperfectly understood. In continental Europe they have not attracted attention; but in Scotland and Ireland they are numerous and well known.

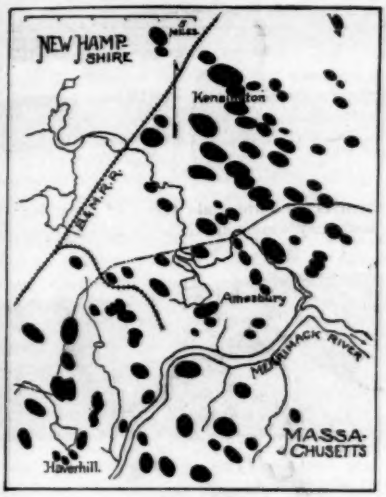

FIG. 2.

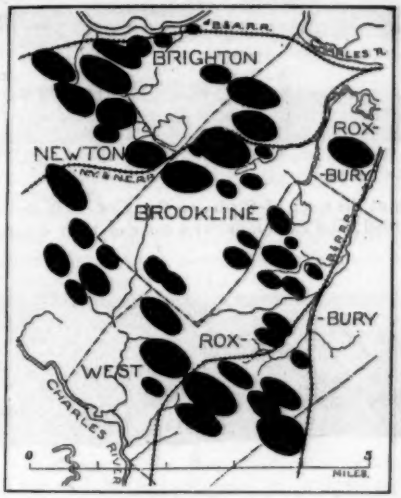

FIG. 3.

Fig. 1 shows a remarkable group of them in northwestern Ireland, taken from a map prepared by Messrs. Kinahan and Close. In this country they have received careful study by Prof. C. H. Hitchcock and Mr. Warren Upham, of the New-Hampshire geological survey. Fig. 2 is copied from the southeastern corner of their map; and fig. 4 presents a sketch of a few of these hills near the Merrimack, in the neighborhood of Amesbury, Mass. Around Boston they are again well developed, as illustrated in fig. 3, from a manuscript map by the author. Fig. 5 is a view of Corey's Hill, a few miles from the city, in the town of Brookline; and fig. 6 represents some of the harbor islands, nearly all of which are drumlins, more or less cut away by the waves. A great series of these drift-hills stretches through central Massachusetts into Connecticut, but its limits have never been studied. Two of them at Charlton, on the Boston and Albany railroad, are drawn in fig. 7.

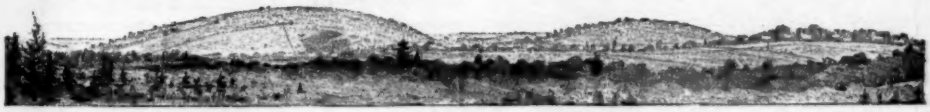

FIG. 4.

FIG. 5.

Again in New-York, between Syracuse and Rochester, elongated drift-hills, that probably deserve the name of drumlins, may be seen in great numbers: here they have entire control of the topography, and

produce a most characteristic landscape. Fig. 8 gives the view south-east and south-west from one of the

Fig. 6.

hills at the town of Clyde, on the New-York central railroad; and fig. 9 illustrates some of their common

Fig. 7.

varieties of form. Farther west they are described only in Wisconsin, where they are sometimes circular

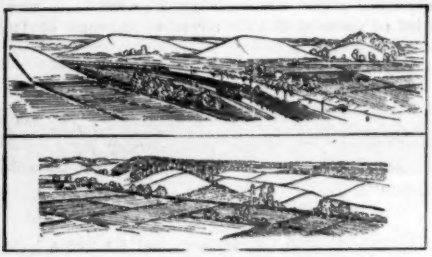

Fig. 8.

and symmetrical, as in fig. 10, from Professor Chamberlin's geological report.

As to origin, there is a general agreement now, among the observers who have studied them, that their present form is an immediate result of ice-action; but just how they were constructed is still an open question. The theory that seems most satisfactory is that which compares them to sand-banks in rivers, and

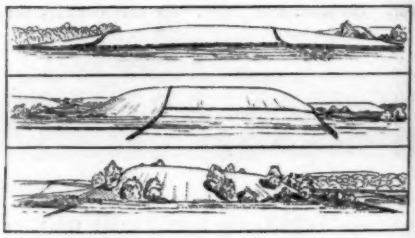

Fig. 9.

thus considers them the result of gradual local accumulation of drift beneath the old glacial sheet, where

Fig. 10.

From this brief survey, it may be seen that drumlins have both a wide and an irregular distribution, and, further, that much more observation and mapping are required before we shall acquire a satisfactory explanation of their seemingly accidental occurrence. more material was brought than could be carried away. The author will be pleased to learn of other localities for drumlins than those here mentioned.

W. M. Davis.

Cambridge, Mass.

HOW FAR A LIGHT MAY BE SEEN UNDER WATER.

MR. EDOUARD SARASIN recently made an interesting report of the experiments of the committee of the physical society of Geneva, in regard to the transparency of the water of the lake. The auxiliary society of Geneva generously gave the committee twenty-five hundred francs to aid in the researches; and Messrs. Soret, Sarasin, C. de Candolle, H. Fol, A. Rilliet, Ch. Soret, Plantamour, and R. Pictet took part. Three candles in a lantern (the flame being fed by a continuous current of air) are visible, at a depth of thirty metres, in the pure water of the lake. An electric light was distinctly seen in the water at the foot of the hydraulic machine of Geneva at a depth of thirty-three metres. A few centimetres more caused the clear image to disappear, which was replaced by diffuse light, faintly perceptible at sixty-seven metres. Messrs. Sarasin and Soret noticed a very characteristic absorption ray in the spectrum of light which had traversed a certain layer of water. This ray had been seen before, but former publications had not attracted the attention of physicists. The recent observations confirmed the fact, and completed the data already obtained. This ray is in the red, near *B*. The same physicists have also undertaken experiments upon the transparency of water when agitated with insoluble substances, such as the chloride of silver, etc. They find that the distance of clear vision varies very little with the increase of the brilliancy of the luminous body and its absolute dimensions. Assisted by Dr. Marcet, the committee has made photographic experiments in the deep portions of the lake. Down to two hundred and fifty metres they find the effect of light on the sensitive plates; but this depth seems to be, at least for the plates now in use, the extreme limit of action of the sun's light. Below this point the lake is a vast, dark chamber.

THE MERIDIAN CONFERENCE.[1]

AT the meeting on Wednesday, the 22d, the work of the conference was finished so far as the transaction of new business is concerned. Gen. Strachey withdrew his resolution for ten-minute meridians for local time, and the conference then proceeded to pass a resolution reciting and affirming its action upon the seven resolutions already adopted. These, as finally determined upon, are as follows:—

1. "That it is the opinion of this congress that it is desirable to adopt a single prime meridian for all nations, in place of the multiplicity of initial meridians which now exist."

2. "That the conference proposes to the governments here represented the adoption of the meridian passing through the centre of the transit instrument at the observatory of Greenwich, as the initial meridian for longitude."

3. "That from this meridian, longitude shall be counted in two directions up to 180°, east longitude being plus, and west longitude minus."

4. "That the conference proposes the adoption of a universal day for all purposes for which it may be found convenient, and which shall not interfere with the use of local or other standard time, where desirable."

5. "That this universal day is to be a mean solar day; is to begin for all the world at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian; and is to be counted from zero up to twenty-four hours."

6. "That the conference expresses the hope, that, as soon as may be practicable, the astronomical and nautical days will be arranged everywhere to begin at mean midnight."

7. "That the conference expresses the hope that the technical studies intended to regulate and extend the application of the decimal system to angular measure, and to that of time, shall be resumed, so as to permit the extension of this application to all cases where it presents real advantage."

A final resolution was then passed, reading as follows:—

"That a copy of the resolutions passed by this conference shall be communicated to the government of the United States, at whose instance, and within whose territory, the conference has been convened."

With a hearty vote of thanks to the government for the facilities offered, to the president, Admiral Rodgers, for his impartiality and courtesy, and to the secretaries for their faithful work, and with a suitable response by the president, the conference adjourned, subject to the call of the latter, for the purpose only of verifying the protocols of the proceedings.

The phraseology of the seventh resolution is somewhat peculiar; and the word 'resumed' looks very much like a mistake in translating 'résumer,' as the resolution was introduced by the French delegates.

[1] Concluded from p. 406.

THE RESOURCES OF THE UNITED STATES.

THE seventh quarto volume of the Tenth census, containing the tables of valuation, taxation, and public indebtedness, must be regarded as the most exact, and one of the most valuable, yet issued. It is largely historical in its treatment of the subject, which allows an exact historical statement more readily than most of the subjects of these volumes; and it thus presents a view of the finances of the United States for a century, which must be of great interest to all economists. There is also much information of a political and personal nature contained in the history of the foreign loans made by the United States and by individual states, including some description of the repudiated debts of Pennsylvania, Missis-

sippi, and other states. The early loans made through Dr. Franklin, John Adams, etc., in France and Holland, from 1776 to 1795, are dwelt upon minutely; and the transactions of Beaumarchais, the financier, author, and publisher, are related at some length. Statistically, the presentation of debt, aggregate wealth, and taxation, is more complete by far than was ever made before for the United States; and, when these statistics are viewed in the perspective of past history, they confirm the wonderful economic resources of a democratic republic like ours. They show that no amount of debt hitherto imposed has prevented the country from increasing rapidly in wealth and financial power, although there are local debts which may remain unpaid for a long time; and that the aggregate debt of the country is now fast decreasing, while the aggregate wealth is gaining more rapidly than ever. That such should be the case so soon after the most costly and desolating civil war known to modern history, is remarkable; but there can be no other interpretation of the figures presented in this volume.

In round numbers, the aggregate wealth of the United States in 1880, was, by careful estimate, $43,600,000,000, of which not quite $17,000,000,000 was that year assessed for taxation. This is between two and three times as much as was the aggregate wealth in 1860, which did not much exceed $16,000,000,000, or less than the taxed valuation of 1880. The aggregate debt of the country in 1880 was a little less than $3,000,000,000, or between six and seven per cent of the estimated wealth. Of this debt, the national government was responsible for $1,942,000,000; the separate states, counties, cities, etc., for $1,048,000,000. This was the *net* indebtedness, which had in 1880 been decreasing for some years, and has since diminished by at least $400,000,000 in the aggregate; so that we probably shall enter the year 1885 with a net debt of about $2,500,000,000, while our population has increased from 50,000,000 in 1880 to 58,000,000, and our wealth to at least $50,000,000,000. The taxation for state and local purposes upon the valuation of 1880 was about $302,000,000, while the national expenditure drawn from imposts and excise was not far from the same sum. This would be an aggregate taxation of less than fourteen dollars a thousand, which is considerably less than they are taxed in Massachusetts, where even the state and municipal taxes often amount to more than that. The *per capita* distribution of local taxation in different sections of the country is curious; being highest in California ($14.60), in Nevada ($14), and in Massachusetts ($13.64), while in the two Carolinas it is only about $1.50, and in Alabama $1.63. Of course this high *per capita* tax implies great wealth in the community and consequently the richest states have the largest percentage of local taxation, considered with regard to the individual tax-payers. Thus Massachusetts, with an assessed valuation of nearly $1,585,000,000, and a population of less than 1,800,000, in 1880, raised that year nearly $24,500,000 of local tax, besides what she paid into the national treasury; while Texas, with a population nearly as great as that of Massachusetts, but with a valuation of property less than a third part as large, raised by taxation only $4,568,716, or less than a fifth of the Massachusetts taxation. Yet the Texans probably feel their light taxes more than the people of Massachusetts feel their heavy burdens.

For a similar reason the debt of a state is often, perhaps almost always, largest where property most abounds to pay the debt with. This does not hold true of all the southern states, some of which have incurred great debts that bear no proportion to the property of the tax-payers. Thus Louisiana, with a population of 940,000, and an estimated wealth of $422,000,000, had a debt of $42,866,000; while Wisconsin, with a population of 1,316,000, and wealth estimated at $969,000,000, had only $11,876,000 of debt. Virginia's estimated wealth was, in 1880, $693,000,000, and Connecticut's, $852,000,000; yet the latter had only $22,000,000 of debt, while Virginia had $42,000,000. In these statistics we include both the state debt, and the debts of counties, cities, etc., within each state; and we give the net indebtedness after allowing for sinking-funds, etc. The three states of largest estimated wealth (New York, Pennsylvania, and Massachusetts) had then the largest debts, — New York, $218,723,000; Pennsylvania, $106,133,000; and Massachusetts, $91,284,000. These amounts seem vast, and are so; yet Massachusetts had $30 of wealth for every dollar of debt, New York $35, and Pennsylvania more than $50. It is curious to observe, however, to what a great and varying extent this wealth escapes taxation; for, while more than half of Massachusetts's property (57 %) is taxed, only a little more than one-third is taxed in New York (34.8 %), and in Pennsylvania less than one-third (31.2%). The New-England states generally tax property more closely than the other states, the

percentage of taxed property rising in Rhode Island to 60, though it falls in Connecticut to 38.4, and in Vermont to 30. In Vermont, also, the tax is very small (only $1,745,000); while New Hampshire, with scarcely more population, raised $2,698,000 by taxation, and Rhode Island, with 56,000 less people, raised $2,603,000. The estimated wealth of Rhode Island, however, was $420,000,000, while that of Vermont was but $289,000,000, and that of New Hampshire, $328,000,000.

The mode of exhibiting property, debt, taxation, etc., by pyramidal diagrams, — the largest states at the bottom, and so on, upward, — is a very effective one to the eye, far more so than the map-form of making such statistics impressive. A map, and an arrangement of divided disks and parallelograms, are also used to illustrate the ownership of the national debt, etc. These devices are a novel and increasing feature of statistical reports, and are doubtless useful to the general and casual reader; but scientific inquirers must be warned against making too much of them. Statistics themselves, in their most exact form, are apt to mislead as soon as comparisons are attempted; for then a multitude of qualifying circumstances come into view, or, if not seen, make the result of the comparison deceptive. To make these statistics still less exact by reducing them to the pictorial form, introduces a new element of error. The investigator must therefore be prepared to see these general views become dissolving views, as he extends his inquiry into the real facts, which the best collected statistics do but disguise with a thicker or thinner veil of imperfect classification.

THE ABORIGINES OF CHILE.

Los aborijenes de Chile. Por JOSE TORIBIO MEDINA. Testo i láminas. Santiago, *Imprenta Gutenberg*, 1882. 427 p. 4°.

THE original sources on which we must depend for a knowledge of the ethnology of Chile are difficult of access, and Señor Medina has performed a meritorious work in collecting them in this volume. Nor is it a mere compilation. To a very full description of the Araucanian Indians he adds a discussion of the archeological relics of that country, such as up to the present we might have sought in vain. Some of his conclusions will be read with interest.

Although no unequivocal signs of quaternary man have been found in Chile, Medina mentions two or three discoveries of stone implements at great depths, one of which, as figured, has every appearance of a genuine quaternary celt. As is well known, in the contiguous territory of the Pampas, Ameghino has described undoubted and abundant human remains from quaternary deposits. At any rate, the state of preservation of the remains in the graves of the Araucanians seems to leave no doubt that they were relatively a late immigration. To the antecedent population the author attributes the curious petroglyphs which are not uncommon on the Chiljan rocks. His effort, however, to make it appear that this earlier people was of a more civilized type, cannot be said to be successful.

Appended to the text are two hundred and fifty-two lithographs of archeologic finds. They include articles in stone, copper, silver, bronze, and pottery. Those in stone present some forms which are not at all, or not often, found with us. Such are the rounded and polished sling-stones, — a weapon popular in South America, but scarcely known in the northern continent. Stone implements for net-making are another curiosity. They are of the shape and size of a cigar, with grooves around each end. Perforated circular stones, about three inches in diameter, are extremely common, and, the author thinks, were used principally to add weight to agricultural implements, — a quite improbable theory. Both the stone implements and the pottery present markedly different degrees of technical skill. This the author explains chronologically, attributing the ruder to a much more ancient date; but the opinion that they merely represent different degrees of contemporary skill is equally probable.

Shell-heaps are numerous along the Chilian coast, some of them six metres in height; but mounds, earthworks, or walls are not described. No fresh information is furnished on the Araucanian language, and this part of the volume has slight value. The history of the Incarial conquest is detailed at length; but the influence of the Incarial culture on the southern tribes, which was very widely felt, is not allowed its proper prominence.

NOTES AND NEWS.

THE Chesapeake zoölogical laboratory of the Johns Hopkins university was stationed this year at Beaufort, N.C., and was open from June 1 to Sept. 19. Owing to the illness of the director, it was most of the time under the charge of Prof. H. W. Conn. The embryology of echinoderms, annelids, and medusae, formed the principal studies. Dr. Brooks nearly completed his monograph of the medusae of Beaufort, and studied the embryology of Eutimia, besides

making some observations on the metamorphosis of stomatopods, to be incorporated in his report on those of the Challenger expedition. Dr. Conn completed his work on the development of Thalassema, and nearly finished a monograph on the crabs of Beaufort, on which he had been engaged for three years. He also studied the development of Serpula, and prepared a paper on larval forms. Dr. Donaldson investigated the physiology of marine vertebrates, making many experiments to determine the relative susceptibility of the different classes to poisons of vegetable origin. He also carried on a series of experiments to determine whether the current theory of digestion in Actinozoa is correct, and reached the conclusion that it was not. Mr. Bateson of England, who carried on his studies by a grant from the Royal society, completed his investigations upon Balanoglossus. Dr. Osborn studied the embryology of Fulgur and Neptunia, and the origin of the body-cavity and reproductive organs of gasteropods. Altogether, ten persons were engaged the whole or a portion of the time in study at the laboratory, and the result of their work has been of the highest importance.

— The first number of the seventh volume of the *American journal of mathematics*, which has just appeared, bears the name of Simon Newcomb, the successor to the chair of mathematics in Johns Hopkins university, as editor.

— The Hydrographic office reports that the bark Nellie T. Guest, which arrived at St. John, N.B., Oct. 20, from Barrow, on the 6th of October encountered in latitude 46° 10′ north, longitude 43° west, a cyclone, during which she lay four hours with decks full of water. Three bags of oil were towed over the weather side, and assisted greatly in smoothing the sea.

— By special request, Sir William Thomson delivered a lecture in Hopkins hall, Baltimore, Wednesday, Oct. 15, on the rigidity of the earth.

— The college for an advanced course of professional study for naval officers, to be known as the Naval war college, will be under the general supervision of the bureau of navigation. The principal building on Coaster's Harbor Island, Newport, R.I., has been assigned to its use, and has been transferred, with the surrounding structures and the grounds immediately adjacent, to the custody of the bureau of navigation for that purpose. The college will be under the immediate charge of an officer of the navy, not below the grade of a commander, to be known as president of the naval war college, who will be assisted by a faculty. The course of instruction will be open to all officers above the grade of naval cadet. Commodore S. B. Luce has been assigned to duty as president of the college.

— The Royal astronomical society has elected Prof. Edward S. Holden, director of the Washburn observatory at Madison, Wis., one of its foreign associates.

— The first annual meeting of the New-England meteorological society was held in Boston on Tuesday, Oct. 21. Sixty-four new members were elected, and the following communications were made: Rain-gauges, by Mr. Desmond Fitz Gerald of the Boston water-works; Rainfall maps, by Mr. W. M. Davis of Harvard college; Weather-observers in New England, by Professor Winslow Upton of Brown university; Establishment of a meteorological station on Blue Hill, Mass., by Mr. A. Lawrence Rotch of Boston.

— Mrs. Dr. Sophie Kowalevski has been elected teacher of mathematics in the new university at Stockholm. As Dr. Kowalevski read last winter a *privatissimum* on partial differential equations with noteworthy results, a new professorship was established for her in the university.

— The facts made use of in Hudson's 'Cause, nature, and prevention of seasickness,' are collected from the author's own experience of twenty-five years at sea. The book lacks a little in physiological accuracy. It, however, is a contribution to a form of treatment which is fast gaining in popular favor, namely, preventive medicine. The author concludes, that by the proper adjustment of the body to gravity and the ocean, through muscular relaxation, seasickness may be avoided.

— Hirsch, the well-known French engineer and author, reports to the Commission centrale des machines à vapeur the results of experiments upon the production of the superheated condition in the water of steam-boilers. Studying the history of such phenomena so far as they are recorded, and conducting a somewhat extended series of experiments, the conclusion was finally reached, that there is no evidence, up to the present time, that boiler-explosions may be caused by the conditions studied, or that such conditions ever arise in practice. If they occur at all, it is only in extremely rare instances, and as a consequence of a coincidence of circumstances seldom to be observed, and which are neither well understood nor well defined. The use of the thermometer is advised to determine the facts bearing upon this question. The commission to which the report is made approve and adopt these conclusions.

— The latest use to which the electric light has been put at the London health exhibition is the illumination of a baker's oven with a plate-glass door. The light was from two incandescent lamps, driven by a Victoria brush-machine, which were inside the oven, where the temperature was from 400° to 600° F., the whole oven being distinctly visible. No more burnt bread!

— The reduction of the French photographs of the transit of Venus, taken Dec. 6, 1882, gives a polar flattening of the planet about the same as that of the earth, viz., $\frac{1}{313}$. From measures during the transit of 1874, Lieut.-Gen. Tennant derived a compression, in the north-south direction, of $\frac{1}{259.3 \pm 77.6}$. There appears, thus, a strong presumption of a real flattening in this direction; which, however, is to be noted as inconsistent with the hitherto received determinations of the inclination of the equator of Venus to the ecliptic.

— Prof. E. S. Holden, director of the Washburn observatory of the University of Wisconsin, has lately collected all the data available for a discussion of the law of distribution of the fixed stars, so far as this is determinable from the method of star-gauging. The data were collected from a comparison with the results of a series of star-gauges in progress with the fifteen-inch equatorial of the Washburn observatory; and they include, 1°, the 683 previously published gauges of Sir W. Herschel, with the places brought down from 1690 to 1860; 2°, the 405 unpublished gauges of Sir W. Herschel, extracted from his observing-books, and generously placed at Professor Holden's disposal by Lieut.-Col. John Herschel (these also reduced to 1860); 3°, 500 counts of stars from the published charts of Dr. C. H. F. Peters; 4°, 983 counts of stars from the unpublished charts of Dr. Peters, from the Paris charts as revised by him, and from the unpublished ecliptic charts of Professor Watson; 5°, 856 counts of stars from the unpublished and published charts of Dr. J. Palisa. These, with the data from Sir J. Herschel's 605 southern gauges, and Celoria's *durchmusterung* of the stars between 0° and + 6°, complete the very valuable collection of data which Professor Holden has brought together in convenient tabular form, and from which one of his most important conclusions is, that the method of star-gauging must be applied to the study of comparatively small regions, and that the results from these are then to be combined into larger groups. Professor Holden hopes that these tables may serve the valuable end of finally disposing of the fundamental assumption that the stars are equally scattered in space, and may bring about the study of their distribution on a more general basis.

— Caspar Johann Bismarck was the editor, in 1694, of one of the most important geographical treatises of the seventeenth century, — the 'Introductio in omnem geographiam' of Philip Cluver, which passed through many editions between 1629 and 1730, and was annotated by various *savants*. Further investigation will be required to determine if this Bismarck belonged to the particular family which has produced the great German chancellor. He was, however, a native of the same region, — Wolfenbüttel in Braunschweig, a town about sixty miles west from Magdeburg. About fifty miles north from Magdeburg, a small town exists which seems to have given its name to the Bismarck family, though the orthography differs slightly. This village is situated in Altmark, a short distance from the River Biese; and its name, 'Bismark,' probably signifies 'market of the Biese.' The name of Bismarck is associated with geographical matters in another way. Before the revolution the students of the university of Orleans, which was then in a flourishing condition, were divided, as was then the fashion, into six 'nations,' two of which were the Normans and the Germans. At this time a certain Christopher de Bismarck was quaestor of the Germanic nation. In that capacity, according to Monseigneur Dupanloup, he held a disputation, celebrated in the annals of the university, with the Normans, claiming that Denmark and the Danes, in spite of their community of origin, belonged, not with the Norman, but with the Germanic nation.

— *Engineering* states that "the pneumatic machine employed by Wroblewski in liquefying and evaporating ethylene and oxygen to produce intense colds has also been recently used by him to evaporate liquid marsh-gas. He has thus obtained a temperature of — 155° C. to — 160° C., which is the temperature of ebullition of the liquid gas. It is a useful temperature as coming between the temperatures of —144° C. and —184° C., which are obtained with ethylene and oxygen; but it varies with the degree of purity of the gas. Oxygen, atmospheric air, nitrogen, and carbolic oxide, cooled with the marsh-gas, can be liquefied under feeble pressures, so that a chemist who succeeds in producing pure marsh gas easily and economically, will render a service to science."

— The periodical report of the City guilds of London institute for the advancement of technical education has just been issued, and gives an extended account of the examinations held at the end of May. A considerable increase is shown in the number of candidates, the total this year having been 3,635, as against 2,397 in 1883. The number of centres has been increased from 154 to 164. Carpentry and joinery were new subjects, and attracted 369 candidates; but metal-plate working, only 2, who did not succeed in passing. The results were considered satisfactory, but show the urgent need for more systematic technical instruction for those who are employed in factories and workshops.

— Dr. Schweinfurth is spending three months in Berlin, preparatory to a new journey through the Egyptian deserts, on behalf of the Berlin academy of sciences, which he will undertake next winter. Though botany is his own specialty, the survey of the desert forms the main object of his journey.

— According to the *Colliery guardian*, Mr. W. E. Garforth, mining-engineer of Normanton, has succeeded in perfecting an invention for the detection of firedamp in mines, which is as remarkable for its simplicity as for its efficiency. It consists of an ordinary India-rubber ball, without a valve of any description; but by the ordinary action of compressing the ball, and then allowing it to expand, a sample of the suspected atmosphere is drawn from the roof or any part of the mine without the great risk which now attends the operation of testing for gas, should the gauze be defective. The sample thus obtained is then forced through a small protected tube upon the flame, when, if gas is present, it is shown by the well-known blue cap and elongated flame. From this description, and the fact that the apparatus can be carried easily in the pocket, the value of this adjunct to the safety-lamp will be apparent. It is thought that explosions are caused frequently by the fire-trier himself, and that his death prevents the cause from being fully ascertained. This danger will now be altogether avoided, and it is said that the detector has been tried at several collieries with completely satisfactory results.

—The *Athenæum* states that Sir Richard Owen's 'History of British fossil reptiles,' which has been upwards of forty years in preparation, is now ready for publication by Messrs. Cassell. On the preparation of the 268 plates with which the volumes are enriched, great labor and attention have been lavished. The edition consists of 170 copies only, each copy being signed by Professor Owen; and the plates from which the illustrations have been printed have been destroyed.

—The time of the glacial period in New Zealand has been studied by R. von Lendenfeld, whose survey in the New-Zealand Alps, partly corroborating and partly extending the results of Dr. von Haast's surveys, shows that the present glaciers are as large, and extend down as far, as those in Norway, where the mean annual temperature is 3° C., whilst in New Zealand it is 11° C. The greater expanse of water in the southern hemisphere, and the consequently greater amount of humidity in the air, and more copious rain and snowfall, are considered to be the cause of this. The sounds in the south-west coast are similar to the fiords in Norway, and the alluvial deposits at their upper ends are small. Scooped out originally by flowing water, these sounds remained unchanged during the period of subsidence of the land, and were not filled up with *débris*, because large glaciers occupied them during that time. As soon as these glaciers disappeared, the formation of the alluvial deposits commenced; and from the fact that the latter are small, and increasing rapidly in size from year to year, the author considers that the glacial period in New Zealand must have been very recent.

—The committee of Lloyds has received from the London board of trade a report concerning the surface-ventilation of the cargo of 2,050 tons of coal carried in the Sutherlandshire from Hull to San Francisco last year. The ship was fitted with tubes to enable the master to ascertain the temperature of the body of the cargo, as recommended by the report of the royal commission appointed to inquire into the spontaneous combustion of coal in ships. The voyage was perfectly free from fire. The commander, Capt. Inglio, highly approves of the tubes, and will continue testing the temperature. A record was kept, and the figures are on record at Lloyds.

—England, so far, is not taking a very prominent part in the International exhibition to be held at Antwerp next year, only about two hundred firms having applied. France especially takes a prominent part, the French government having voted seven hundred and fifty thousand francs towards the expenses of the undertaking, and appointed two official commissions; while the municipal council of Paris has promised a grant of a hundred thousand francs for the purpose of sending workingmen delegates from that city. Prince Rudolph of Austria has also influenced the Vienna chamber of commerce to make strong efforts on behalf of the concern. The United States will be well repesented; and the Dominion of Canada better so than the mother-country, as it gives both official recognition and a substantial credit. Germany is also making strong efforts to be officially represented.

—Mr. Clermont Ganneau, the French archeologist, has been describing for the benefit of his countrymen the antiquities of Palestine now treasured in London, and advises the formation of a vast Palestine museum and library, one of the departments of which should be "an extensive and animated panorama of the Holy City, and dioramic views of the principal localities and of characteristic scenes of popular life in Palestine, in order to add to this scientific combination an irresistible element of attraction and success. In short, in the centre of London should be created a representation as faithful, varied, and complete as possible, of Palestine, past and present, which would be as a living commentary on the Bible." England, says Mr. Clermont Ganneau, being 'so passionately fond of biblical studies,' would be the country most likely to carry out his ambitious project.

—Mr. Wood Mason of the Calcutta Indian museum has recently drawn up a report on those insects from which the tea-gardens of Assam most suffer. He says the tea-bug or 'mosquito-blight,' and the tea-mite or 'red spider,' are the only two insects which are at present known to do such injury as to materially diminish the profits of the owners. Both these insects pass their whole lives on the tea-plant, and have never been found on any other plant. Such, at least, is the result of the most careful investigation. The mite lives in societies on the upper portion of the full-grown leaves, beneath an exceedingly delicate web which it spins for itself as a shelter. It punctures the leaves, and then pumps out the liquid contents of the epidermis. The only remedy which has been discovered to check their ravages, and it has not proved very effectual, is to sprinkle the affected bu hes with muddy water. The tea-bug is still more destructive, and particularly to the trees of the milder juice; for those which afford a strong and rasping liquor enjoy an almost complete immunity from its attack. Mr. Wood Mason appends to his report engravings of these destructive creatures.

—The *Cape times* says that a gigantic earthworm has been sent from the colony to Mr. Frank Biddard, the prosector of the Royal zoölogical society, who has been desirous of obtaining one of these monsters for scientific purposes. The Rev. G. Fisk, F.Z.S., with whom Mr. Biddard has corresponded on the subject, received the worm from Mr. H. W. Bidwell, who found it in the botanic garden at Uitenhage. The longest measurement of the creature yet taken reaches six feet five inches; but it is thought, if it were drowned, the measurement would extend to ten feet, this mode of extinction having an extremely relaxing effect on the frame or substance of the worm. The surface of the upper portion of the body shows a bright green color, of variable intensity, but otherwise it is a loathliful animal. Lumbricus microchaeta is the name by which it will be immortalized in the records of the Zoölogical society.